

**AUTOMATED DYNAMIC PRESSURE-RESPONSIVE DISPENSING  
SYSTEMS, AND ASSOCIATED METHODS AND COMPUTER PROGRAM  
PRODUCTS**

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**Abstract**

Methods, systems and computer program products for dispensing hyperpolarized gas include or operate a plurality of spaced apart individually operable valves positioned in fluid communication with and located along a gas flow path. The gas flow path that is intermediate the spaced apart valves defines at least one metered holding space with an associated volume that can be selectively isolated from the remainder of the gas flow path. The system and methods include a pressure sensor operably associated with the gas flow path and a control module operably associated with the plurality of spaced apart valves and the pressure sensor, the control module being configured to direct the operational sequence of the opening and closing of the valves, wherein, in operation, the control module directs a plurality of capture and release cycles, the cycles being successively carried out so to temporally isolate a predetermined portion of the gas flow path to capture and then release discrete amounts of gas therein.